Intermediate Algebra Core Map

	Standard	Content Objectives	Process Standard/Objective	Suggested materials/strategies
September	Algebra Geometry Algebra Geometry Algebra	* Review solving systems of linear equations numerically, algebraically, graphically and using technology **2.2.7 -** Solve and graph systems of linear inequalities **2.2.2, 3.3.1 -** Review absolute value as a distance from zero and solve one-variable, first degree absolute value equations a) on a number line (graphically) b) algebraically **2.2.4, 3.2.2 -** Introduce and solve single variable, absolute value inequalities a) numerically, guess and check b) algebraically c) graphically, number line **2.1.2, 2.2.2, 2.2.4, 3.2.1, 3.2.3, and 3.2.1 -** Introduce and solve linear absolute value equations, functions, and inequalities, i.e. $y \leq x+1$. Identify the domain and range. c) numerically d) algebraically e) graphically **2.1.1 -** Compare and contrast relations and functions using ordered pairs, tables, and graphs. Using real-world data from tables and graphs, review domain and range and identify elements for each **1.3** - Introduce matrices and identify their use in the real-world	**Problem solving:** Use appropriate methods for computing, i.e. pencil/paper, calculator, mental. Propose and critique alternative approaches, "Did anyone else think of a different way?" Draw a picture or diagram. Look for a pattern. Make a list, table, graph or equation. Eliminate possibilities. Solve a variety of multi-step, complex problems. **Reasoning and proof:** Link problem solving to sequence of steps and draw reasonable conclusions. Examine pattern, note regularities and irregularities in various types of problems. **Communication:** Employ precise language and notation. Clearly express ideas to peers and teacher **Connections:** Formulate real-world situations that require extended investigations, then solve them and justify answers. **Representation:** Represent problem situations verbally, numerically, graphically, geometrically, or algebraically.	Graphing calculator, inequality application on TI-83, real-world data, graph paper, tables Number line, student formations, physical models Guess and check CBR, CBL, real-world experiments such as temperature over time, distance vs. time, bubble gum blowing contest (number of bubbles over time intervals) Letter frequencies on a page of writing, Internet, TI-Interactive TRAX or bus schedules, stadium seating arrangements, spreadsheets, order forms, menus, stock market reports NCTM Navigating series

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October	Number and Operation Algebra Number and Operation	**1.1.3 -** Using real-world applications, add, subtract and multiply matrices using paper and pencil for simple cases and technology for larger matrices a) **1.3.1** - Identify matrices that can be added, subtracted or multiplied b) **b. 1.3.2** - Demonstrate that matrix multiplication is not commutative **1.1.4, 1.3.3 -** Introduce and find the multiplicative inverse of a matrix using paper and pencil for a 2x2 and technology for larger matrices. Identify additive and multiplicative identities and inverses of a matrix when they exist **2.2.6 -** Using technology, solve systems of linear equations with three variable (matrices) **1.2.3 -** Simplify simple numeric radical expressions such as, $\sqrt{24}$, $3\sqrt{(2+3)} \bullet \sqrt{2}$ **1.2.2, 1.2.3 -** Identify the need for the square root of a negative number and define the imaginary number $i = \sqrt{-1}$. Simplify numeric radical expressions involving imaginary numbers. **1.2.1, 1.1.2 -** Extend the number system to include complex numbers in the form $a + bi$. Add, subtract and multiply complex numbers	**<u>Problem solving:</u>** Propose, critique and value alternative approaches. Check for reasonableness. Solve a simpler, related problem. "Where have we seen ideas like this before?" Look for a pattern. **<u>Reasoning and proof</u>:** Make and investigate mathematical conjectures. Realize that observing a pattern does not constitute a proof. Make and investigate mathematical conjectures **<u>Communication:</u>** Express mathematical ideas clearly to peers and teacher. Employ precise language and notation **<u>Connections:</u>** Connect mathematics expressions to real-world situations. Find applications of mathematical concepts in newspapers, magazines, television, internet or other sources. Explore historical contributions to mathematics. **<u>Representation:</u>** Use technology to explore and formulate conjectures. Represent problem situations verbally, numerically and algebraically.	TRAX or bus schedules, stadium seating arrangements, spreadsheets, order forms, menus, stock market reports Cooperative groups Graphing calculators Color tiles, centimeter cubes Cryptography (use inverse matrices to decode) Markov chains (see a discrete math text or internet) Weather, tornado (See movie "Twister") Fractals, and history of fractals Mandelbrot sets, Julia sets patterns in nature Spreadsheets NCTM Navigating series Granite District Math website has many links (www.granite.k12.ut.us/Math/mathpage.html)

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November	Geometry Algebra Geometry Algebra	**3.2.4, 2.1.2, 2.2.11 -** Introduce square root functions and sketch their graphs. Identify the domain and range and represent using interval notation, i.e. $a < x < b$, (a,b), [a,b] * Review multiplication of polynomials using an area model (use same examples as Algebra map) **2.1.2 -** Use area models to create a table of values, plot ordered pairs and identify domain and range. Using the pattern from the tables, discover and generalize the equation $y = x^2$ **2.1.3 -** Introduce simple function notation to generalize and summarize the transformations in the lessons to follow **3.2.7, 3.2.1, 2.1.2 -** Perform transformations of a quadratic function to discover the equation $y = a(x- h)^2+k$ and identify the domain and range. a) discover the effect of k, performing vertical shifts b) discover the effect of h, performing horizontal shifts c) discover the effect of a, performing vertical stretches and shrinking d) discover the effect of a, performing vertical reflection e) **2.3.2** - identify the vertex, maximum or minimum values, intercepts, and axis of symmetry for the parabola given a graph and a table	**Problem solving:** Extend mathematical knowledge by considering the thinking strategies of others. Make a model or a simulation. Look for a pattern. Guess and check. Solve a simpler or related problem. Draw a picture or diagram. Ask, "How are these ideas related?" Where have we seen a problem like this before?" **Reasoning and proof:** Make and investigate mathematical conjectures. Examine patterns noting regularities and irregularities in various types of problems **Communication:** Express mathematical ideas coherently and clearly using precise language and notation **Connections:** Recognize and apply mathematical ideas and relationships in areas outside the mathematics classroom such as art, science and in everyday life. **Representation:** Use a variety of visual representations including patty paper, graph paper, manipulatives and technology	AlgeBlocks, color tiles, patty paper Tables, graphing calculator, Transformation graphing application on the TI-83 TI-Interactive with slider bar Graph paper, pictures Capri Geometry or Geometer's Sketchpad Bouncing ball activity Tiling around hot tubs problem CBL, projectile motion NCTM Navigating series Granite District Math website has many links

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December	Geometry Algebra Geometry Algebra Geometry Algebra	**3.2.5 -** Write an equation of the parabola in the form $y = a(x-h)^2+k$ given the graph **3.2.7 -** Perform transformations of stretching, shifting and reflecting the graphs of linear, absolute value, radical and quadratic functions a) generalize effects of a, h and k in the equation $y = a * f(x-h)+k$ b) **2.3.2 -** identify the vertex, maximum or minimum values, intercepts, and axis of symmetry for absolute value **2.3.3 -** Introduce standard form of quadratic equation $y = Ax^2 + Bx + C$ and connect to the form $y = a(x-h)^2+k$ a) graphically b) algebraically by completing the square **2.3.3 -** Review the equation of a circle. Write the equation of a circle in the form $(x-h)^2 + (y-k)^2 = r^2$ by completing the square **2.2.1 -** Introduce the need for solutions to quadratic equations using real-life situations. Include interval notation to describe real-world domain **2.2.1, 3.3.1 -** Solve quadratic equations a) graphically b) algebraically by factoring	**Problem solving:** Draw a picture or diagram. Make a model. Choose appropriate operations. Reflect and evaluate mathematical thinking processes used in solving problems. Ask, "What made you think of that?" **Reasoning and proof:** Explain and justify problem solving procedures. Identify information as necessary, sufficient or extraneous and conclusions as valid or invalid. **Communication:** Organize and consolidate mathematical ideas using class and group discussion, portfolio or journal **Connections:** Formulate real-world situations that require extended investigations, solve them and justify answers. Recognize and apply mathematical ideas in other curricular areas such as art or science. **Representation:** Use a variety of visual representations such as graph paper, models, manipulatives, nets and technology to explore and formulate conjectures related to concepts. Use appropriate symbolic representation	Transformation graphing application on the TI-83 TI-Interactive with slider bar Graph paper, pictures Capri Geometry or Geometer's Sketchpad AlgeBlocks for completing the square graphing calculator Use a sprinkling system layout design to cover area Crop circles Use real-world time vs distance applications such as ball bounce, area Trajectory situations, sports applications, football, baseball, racquetball, Internet resources Cooperative Learning Structures NCTM Navigating series Granite District Math website has many links

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January	Algebra Probability and Data Analysis Algebra Geometry	Introduce the quadratic formula and use it for solving quadratic equations **2.2.5 -** Write a quadratic equation given the rational roots or zeros of the function **5.1.1 -** Using technology, determine the quadratic regression equation that fits real-world bivariate data a) **5.1.2** - analyze the meaning of the maximum or minimum and the intercepts of the regression equation b) **5.1.3** - make predictions and estimations and determine their reasonableness **2.3.1 -** Interpret rates of change by analyzing graphical and numerical data for quadratic functions **2.2.4, 3.2.2 -** Solve single variable quadratic inequalities and sketch their solutions on a number line **3.2.3 -** Sketch the solutions of quadratic inequalities in two variables on a Cartesian coordinate system	**Problem solving:** Evaluate thinking processes used in solving problems. Identify counter examples. Make a model or simulation. Solve a simpler or related problem. Ask, "How does today's work relate to what we did earlier?" Determine reasonableness **Reasoning and proof:** Explain and justify problem solving procedures. Identify information as necessary, sufficient or extraneous. **Communication:** Organize and consolidate mathematical thinking using group discussion, oral presentations and written reports. **Connections:** Establish connections among mathematical expressions, physical models, pictorial models and real-world situations. **Representations:** Use physical models, visualizations and appropriate symbols	Cooperative Learning Structures Graphing calculator (see stat plots and delta list for interpreting rates of change), CBR, CBL, Internet (TI-Interactive has web site with links with good data) NCTM Navigating series Granite District Math website has many links CMU data and story library website NCTM Navigating series Number line, graph paper
February	Number and Operation Algebra	Find the value of exponential and radical numeric expressions with exponents or roots greater than 2 **2.2.10 -** Introduce the need for rational exponents in numeric expressions and recognize that rational exponents are used to represent radicals, i.e. $8^{1/3}$ = the cube root of 8 **2.2.9, 1.1.1 -** Simplify basic numeric expressions with rational exponents such as $8^{2/3}$ and review that A^{-n}= reciprocal of A^{n} **2.2.3 -** Solve radical equations including those with extraneous roots **2.3.1 -** Interpret rates of change by analyzing graphical and numerical data for radical functions **2.2.8 -** Multiply and divide simple rational expressions such as 1/x, 3x/2, 1/(x+1) **2.2.8 -** Review finding LCM for variable expressions such as $3x^2$ and 6x, then add and subtract simple rational expressions, i.e. 3/2 + 1/x, 1/x + 2/(x+1)	**Problem solving:** Select and use appropriate methods for computing such as mental computation, estimation, paper and pencil and calculator or computer. Guess and check. Make a list, table, graph or equation. **Reasoning and proof:** Draw reasonable conclusions. Formulate counter examples. Identify extraneous information. **Communication:** Employ the precise language and notation to clearly express mathematical ideas **Connections:** Formulate real-world situations that require extended investigations. Recognize applications in everyday life. **Representation:** Represent concepts using physical models, visualizations and appropriate symbolic notations.	Centimeter cubes, linker cubes See Granite District Math links for real-world data Calculator Cooperative structures AlgeBlocks for LCM NCTM Navigating series Breaking distances (application of square root functions–speed is function of breaking distance)

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March	Algebra Probability and Data Analysis Measurement	**2.2.8 -** Solve simple rational equations such as 3/2 + 1/x=2 but no more difficult than 6/x + 12/(x+1) = 7 **2.1.4 -** Add, subtract, multiply and divide simple functions. Find the compositions of two simple functions **2.1.5 -** Find the inverse of a function a) by interchanging the values of domain and range b) by reflecting across the line y = x to obtain the graph c) by using Algebra to find the equation **5.2.2 -** Calculate a probability using the counting principle -Introduce permutations and factorials as a tool for finding permutations. **5.2.1 -** Introduce combinations and identify the difference between combinations and permutations **5.2.3 -** Calculate simple permutations and combinations of ***n*** objects taken ***r*** at a time using technology * Define and introduce the need for radians. a) Review angles and angle measurement b) **4.1.1** Convert angle measurements between radians and degrees	**Problem solving:** Reflect and evaluate thinking processes used in solving problems. Select and use appropriate methods for computing, i.e. mental computation, pencil/paper, calculator or computer. Identify counter examples. Work backwards. Choose an appropriate operation. Use proportional reasoning. Ask, "What makes you think that?" **Reasoning and proof:** Use a variety of formal and informal proofs appropriate to the concepts. Realize that observing a pattern and stating a conjecture do not constitute a proof. **Communication:** Organize and consolidate thinking using communication methods such as group discussion, journals, portfolios, oral and written reports. **Connections:** Find applications in newspapers, magazines, television, radio and other sources. Explore historical and multi-cultural contributions to mathematics. **Representation:** Use a variety of visual representations, i.e. graph paper, models, manipulatives, and technology	Graphing calculator, computer software graph paper and patty paper Cryptography (use function to encode and inverse function to decode) Internet search for encoding methods (movie, "a beautiful mind") Cooperative structures cards, dice, spinners, real-world models of the counting principle such as wardrobe possibilities Probability Application on TI-83 Probability games and simulations, sports line-ups or seating arrangements Elections, winning prizes , almanac compass, protractor, pictures, and diagrams

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April	Measurement Algebra Geometry Algebra	**4.2.1, 4.2.2 -** Find the length of an arc and the area of a sector in a circle using radian measure * Review right triangle trigonometry (sine, cosine, tangent). Introduce cosecant, secant and cotangent. **2.1.6, 4.1.2 -** Relate sine, cosine and tangent, cosecant, secant and cotangent to the unit circle. Calculate the exact values of sine, cosine and tangent functions for the special angles of the unit circle **2.1.2, 3.2.6 -** Graph sine and cosine functions identifying the domain and range **3.2.8 -** Perform transformations on the sine and cosine functions involving amplitude, period, phase shift (horizontal), vertical shift and reflections **3.3.2 -** Solve problems using graphs of sine and cosine functions **2.1.7 -** Express angle measures in degrees or radians given the trigonometric value	**Problem solving:** Eliminate possibilities. Use proportional reasoning. Solve multi-step, non-routine, complex problems including puzzles, applications, patterning, and open-ended or extended problem solving projects. Use models **Reasoning and proof:** Examine patterns noting regularities and irregularities. **Communication:** Use group discussion, oral and written reports. **Connections:** Establish connections among mathematical expressions and pictorial representations. Explore multi-cultural contributions. **Representation:** Represent problem situations verbally, numerically, graphically, geometrically and algebraically.	Models of various circular objects, -Planets/orbits, pizza, bicycle tires Geoboards, dot paper origami Graphs and graph paper, altitude, architecture Graphing calculator, Geometer's Sketchpad or Cabri Hypsometer Tuning forks and music CBL microphone, light probe (see fluorescent light variation of intensity) Slinky for harmonic oscillation, build wind chimes, tuning forks and CBL (recognizing harmony and dissonance)
May		Review for and take the CRT Extensions beyond the core such as logarithms, sequences and series, exponential growth and decay, conics	**Apply appropriate teaching processes in each of the five process standards as listed previously.**	review games and cooperative structures test pool questions